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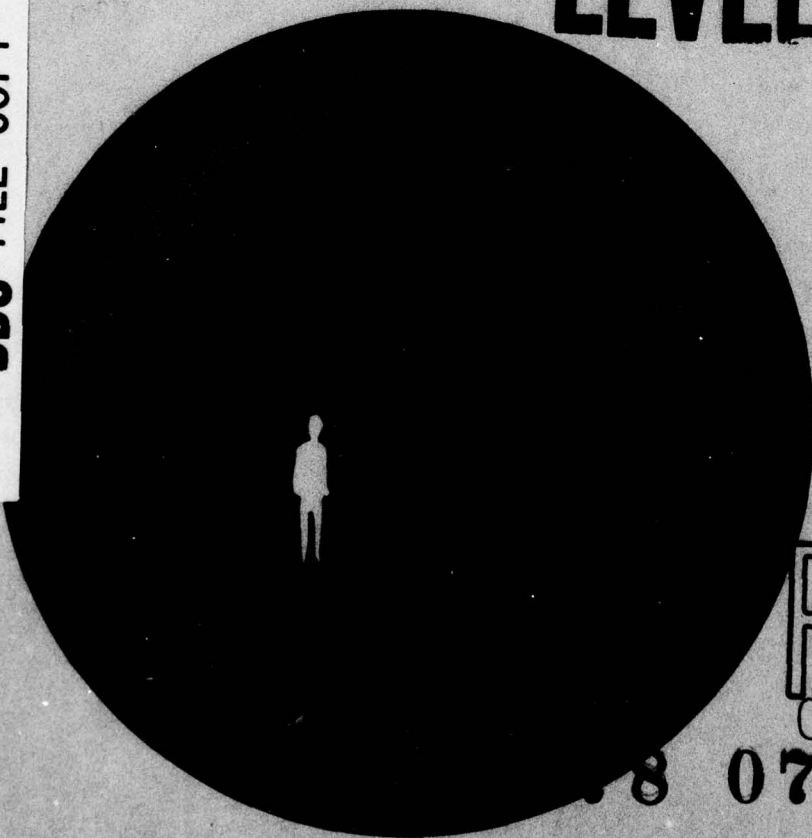
DEVELOPMENT OF THE NAVY CONSOLIDATED
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6 DEVELOPMENT OF THE NAVY CONSOLIDATED
ELECTRONIC WARFARE OPERATOR CURRICULUM
Focus on the Trained Man.

10 Ted E. /Pearson,
Lysle R. /Mac Keraghan
Willard B. /Stubbs

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This report chronicles the development of the Navy Consolidated Electronic Warfare (EW) Operator Training program. The report focuses on the efforts of the Training Analysis and Evaluation Group (TAEG) in developing the overall system configuration for EW operator training. Specifically, this involved the integration of instructional technology and simulation technology in the design of the training system. Additionally, TAEG's managerial responsibilities in this program are highlighted.		

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TAEG Report No. 56

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
I	INTRODUCTION.	7
	Overview of EW Training Consolidation	7
	Organization of the Report.	11
II	CURRICULUM DEVELOPMENT 1972 TO 1977	13
	Introduction.	13
	Analyses (1972 to 1974)	13
	Training Analysis.	13
	EW Job Analysis Workshops.	13
	Generalized Electronic Warfare Training Simulator (GEWTS) Study	13
	Consolidated Navy Electronic Warfare Training Plan (CNEWTP)	14
	Curriculum Development Milestones (April 1974 to June 1976) .	14
	Milestones in EW Program Development (July 1976 to April 1977).	16
	Impact of Device 10H1 Procurement on Consolidated EW Curriculum Development	16
	EW Mission Scenarios	17
	Considerations in Curriculum Design.	18
	Inputs from Consolidated Navy EW Training Plan	18
	Device 10H1 Considerations.	19
	Treatment of Job Analysis Data.	19
	The EW Operator Problem-Solving Model for Use in EW Operator Curriculum Design	29
	Selecting the Sequence of Instruction	29
	Selection of Training Tasks for the Consolidated EW Operator Training Curriculum	37
	Validation of the Tasks Selected for Consolidated EW Operator Training.	39
	CNET Actions Concerning Consolidated EW Operator Curriculum Development Requirements	40
	Consolidated EW Operator Curriculum	41

TAEG Report No. 56

TABLE OF CONTENTS (continued)

<u>Section</u>	<u>Page</u>
III FUTURE PLANS.	45
Introduction.	45
Milestones.	46
EW Operator Technical Subsystem for Curriculum Development Project.	46
The Plan of Action for Developing Off-Line (Non-10H1) EW Operator Curriculum Components.	49
Major Prerequisites to Curriculum Development	50
Curriculum Development Project Management	50
Future Reports.	52
APPENDIX A Profile of Input Population to Consolidated EW Operator Training System	53
APPENDIX B TAEG Guidelines for the EW Instructional Program Development Branch	59

TAEG Report No. 56

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Student/Subject Material Matrix.	20
2	EW Training Pipeline	21
3	General EW Operator Problem-Solving Model.	35
4	Consolidated EW Operator Training System Student Flow Model.	38
5	EW Curriculum Development Milestones	47
6	EW Curriculum Development Work Flow.	48
7	CNEWS Operator Training Curriculum Development Organizational Relationships	51

TAEG Report No. 56

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Sample EW Task Listing (ESM Billet).	15
2	Common Core Curriculum Development Tasks	17
3	Student Annual Input Load for Formal Training at the EW School, NTTC Corry (Officer)	22
4	Student Annual Input Load for Formal Training at the EW School, NTTC Corry (Enlisted).	23
5	Student Annual Input Load for Formal Training at the EW School, NTTC Corry (Reserve, Civilian, and Other Services).	25
6	Summary of Student Annual Input Load for Formal Training at the EW School, NTTC Corry	26
7	EW Suites and Associated EW Operational Equipments	27
8	Generalized EW Equipment Functional Capabilities	28
9	EW Duty/Task Listing Within Mission Phase Framework.	30
10	Common Core Skill and Knowledge Requirements for Navy EW Operators.	33
11	Task Performance Proficiency Levels.	39
12	Topical Outline of Generalized EW Operator Curriculum.	42
B-1	Phase I - Basic Operator Training (Modules 1-7).	61
B-2	Phase II - Advanced Operator and Evaluator Training (Modules 8-21)	61
B-3	Phase III - Fleet Operations, Mission, and Watchstanding Exercise Training (Modules 22-48).	63

TAEG Report No. 56

SECTION I

INTRODUCTION

Navy operational requirements during the Southeast Asia conflict (1965 to 1973) resulted in a substantial increase in electronic warfare (EW) equipments and capabilities. Unfortunately, this rapid expansion fragmented EW training. Hastily generated courses supported by inadequate training devices and materials evolved. Training needs soon far exceeded capabilities.

The undesirable effects of this rapid EW expansion were quickly felt, and corrective measures were planned. In 1972, the Navy initiated a program to develop a consolidated EW training system to meet fleet personnel readiness requirements. The purpose of consolidation was to capitalize on the high degree of EW job commonality by integrating air, surface, and subsurface EW training.

This report chronicles one area of the program--the design and development of the Navy Consolidated Electronic Warfare Operator curriculum. It provides a record of a significant innovation in military training resulting from the integration of instructional system development concepts, electronic/hardware technology, and sound managerial practices. With no intent to minimize the importance of other program participants, the report focuses on areas of program development in which the Training Analysis and Evaluation Group (TAEG) was given a significant role.

OVERVIEW OF EW TRAINING CONSOLIDATION

As a prelude to discussions which follow, a chronology of the significant events and initiatives in the EW training consolidation process is provided below. This provides a base for comparing the materials presented in subsequent sections wherein the EW curriculum development relationships of listed events and initiatives are amplified. The chronology is also a useful reference for personnel associated with the EW training consolidation program.

- a. 1968--Spurred by Southeast Asia operations, the Chief of Naval Operations/Chief of Naval Personnel (CNO/CHNAVPERS) began efforts to improve EW training. A catalyst was the Joint Chiefs of Staff Memorandum of Policy (JCS MOP) No. 95 which defined EW as a "Warfare" area and emphasized the need for a surface Navy EW technician rate.
- b. 1970 (December)--The surface Navy EW rate was established. Scattered training assets of the Surface EW community were consolidated at Service School Command, Treasure Island, California. Interim maintenance and operator training (basic and advanced) was initiated. Training capabilities were augmented by limited procurements of training devices. Expansion of training at Treasure Island was held to a minimum while planning for EW training shifted from the Bureau of Naval Personnel (BUPERS) to the newly established Naval Training Command.

TAEG Report No. 56

- c. 1971--The Naval Training Command assumed responsibility for EW training.
- d. 1972 (January)--An Electronic Warfare Training Management Committee was established by the Chief of Naval Education and Training (CNET) to develop a long-range EW training improvement plan. Committee members represented the CNO, the Chief of Naval Material (CHNAVMAT), CHNAVPERS, the operational fleet, CNET, and CNET functionals.
- e. 1972 (February)--The initial Electronic Warfare Training Management Committee meeting was held. Requirements for an EW training analysis were identified. The committee recommended that TAEG conduct the analysis.
- f. 1972 (March)--Initial EW tasking of TAEG by CNET. (In addition to this tasking, TAEG received two subsequent assignments from CNET. These taskings, in 1976 and 1977, are discussed later in this section.) The CNET requested that TAEG "...analyze the training requirements and define the training system objectives and training equipment characteristics needed to support consolidated electronic warfare training" (CNT letter Code 01A of 13 March 1972).

The studies published by TAEG^{1,2,3} provided guidelines for the orderly establishment of a consolidated EW operator/maintenance training system. Proposed training system elements included:

- . integrated basic EW training for Naval air, surface, and subsurface personnel
- . a common core EW curriculum for EW fundamentals, concepts, and principles

¹ Electronic Warfare Training Analysis. TAEG Report No. 4. 1972. Training Analysis and Evaluation Group, Orlando, FL 32813. AD A041217.

² Ted E. Pearson, Lysle R. Mac Keraghan, Willard B. Stubbs, and Edward O. Moore, Jr. Electronic Warfare Maintenance Training Analysis, Executive Summary. TAEG Report No. 9-1. February 1974. Training Analysis and Evaluation Group, Orlando, FL 32813. AD A018445.

³ Ted E. Pearson, Lysle R. Mac Keraghan, Willard B. Stubbs, and Edward O. Moore, Jr. Electronic Warfare Maintenance Training Analysis. TAEG Report No. 9-2. March 1974. Training Analysis and Evaluation Group, Orlando, FL 32813. AD A019191.

TAEG Report No. 56

- . computer-based generalized training devices possessing computer aided instruction (CAI) capabilities. Growth potential to meet outyear EW requirements.
- g. 1974 (January)--The Consolidated Navy Electronic Warfare Training Plan (CNEWTP), OPNAV X-70-7304, was promulgated by CNO under mission sponsorship of the Director of Naval Education and Training (DNET), CNO OP-099. The CNEWTP incorporated TAEG study recommendations and set the following program development goals:
 - . FY 71-75--Program for procurement of major training devices. Construct the Navy Consolidated EW School at the Naval Technical Training Center (NTTC), Corry Station, Pensacola, Florida. Transition training from the interim facility at Treasure Island, California, to NTTC Corry. (Note: Though published in 1974, the CNEWTP reflects program events from 1971 on.)
 - . FY 76-78--Continue development of the formal training program in preparation for arrival of training devices.
 - . FY 78-82--Upgrade the instructional system to reflect changes in Navy EW training requirements brought about by the operational equipments.
- h. 1975 (May)--The Consolidated Navy Electronic Warfare School (CNEWS) was inaugurated at NTTC Corry.
- i. 1976 (February)--The Naval Training Equipment Center (NTEC) Orlando, Florida, initiated a contract with Grumman Aerospace Corporation to procure operator training Device 10H1, the generalized Navy Electronic Warfare Training Simulator (NEWTS).
- j. 1976 (July)--CNET placed emphasis on maintaining overall EW program continuity to reach long-term objectives. The Training Analysis and Evaluation Group was assigned multiple tasking by CNET letter Code N-223 of 2 July 1976 to:
 - . "act as advisors to the Chief of Naval Education and Training in order to assure the mission sponsor (OP-099) that the objectives of the NEWTS (Device 10H1) military characteristics and specifications are maintained. Additionally, and of immediate concern, is the requirement to develop validated working level EW operator task descriptive data and EW mission scenario flow charts and descriptive data to expedite NEWTS system hardware/software/CAI design considerations. The Director, Training Analysis and Evaluation Group not only developed the baseline data for this effort as part of its original 1973 EW studies, but is the most qualified organization in being able to maintain continuity of the training concept in design of the NEWTS trainer.

TAEG Report No. 56

- . "assist OP-099, CNET and CNTECHTRA as otherwise deemed necessary to ensure successful completion of this (EW consolidation) program."
- k. 1976 (August)--The Training Analysis and Evaluation Group submitted to CNET an assessment of specific tasks required to complete the development of the CNEWS operator training system.
- l. 1977 (May)--The Chief of Naval Education and Training directed that EW curriculum development, including Device 10H1 training lessons (teachware), be developed through the CNET Instructional Program Development Centers (IPDC). With this decision CNET gave the following direction and tasking to the Chief of Naval Education and Training Support (CNET SUPPORT) and TAEG (CNET Memorandum for the Record Code-512 of 27 May 1977):
 - . "...that CNET Support should take the lead role in the management of EW operator curriculum development even though the development of this curriculum will be somewhat different from a normal rating effort. The difference is that the EW Operator curriculum will be developed to support a mission area vice a specific rating, plus the operator curriculum will be based on an analysis done by TAEG in 1974, vice an analysis done by an IPDC.
 - . "TAEG, Orlando personnel (TAEG team) presently assigned to the Navy Electronic Warfare Training System (NEWTS) Instructional Program Project will serve as the EW Operator project management for CNET Support (N-5), and will be integrated for the duration of the subject program development, into the Instructional Program Development (IPD) effort. Administrative control of the TAEG Team will remain with TAEG, Orlando.
 - . "The present TAEG Team will interface, for the CNET Support, with the (Device 10H1) contractor (Grumman) developing the generic simulator and with CNTECHTRA. Data libraries for the trainer will be developed by a contractor and if a contract can be prepared in time, begin development during FY 1977. Instructional Modules in support of the NEWTS (off-line) will be developed by an IPDC Center."

The Chief of Naval Education and Training Support initiated action for EW operator curriculum development by: (1) reprioritizing the EW course IPD tasking, (2) establishing an IPD Branch at NTTCC Corry, and (3) providing funds for the NEWTS teachware development contract.

- m. 1977 (July)--The Training Analysis and Evaluation Group submitted a Plan of Action and Milestones (POA&M) for accomplishing EW operator curriculum development through the IPDC.

TAEG Report No. 56

- n. 1977 (September)--The Naval Training Equipment Center awarded a teachware contract to Grumman Aerospace Corporation for the NEWTS computer data base libraries and a NEWTS computer/lesson authoring system which minimizes lesson authoring time.
- o. 1977 (October)--Instructional Program Development Center work efforts were initiated at NTTC Corry.

From October 1977 to the date of this report, major efforts have been underway, and significant progress has been made toward curriculum development. The IPDC has developed and validated pilot models of instructional materials as a prelude to production. The IOH1 contractor is developing the teachware data base and experimenting with special EW oriented CAI authoring techniques. Recent innovations in TV data presentation are being utilized to satisfy unique EW training requirements. Techniques for interfacing Device IOH1 with the Navy's central computer managed instruction (CMI) system in Memphis, Tennessee, are being developed. These and other program events will be the subject of future TAEG efforts.

ORGANIZATION OF THE REPORT

In addition to this introduction, the report contains two sections and two appendices. Section II discusses consolidated EW training system operator curriculum development events which occurred prior to 1977 which influence the remaining curriculum development efforts. Section III addresses future plans and activities. Appendix A presents a profile of the input population to the consolidated EW operator training system. Appendix B contains guidelines which are being used in the EW curriculum development.

TAEG Report No. 56

SECTION II

CURRICULUM DEVELOPMENT 1972 TO 1977

INTRODUCTION

This section discusses the major efforts in EW operator job task data collection and analysis. The effects of management decisions on EW operator curriculum development are presented, and the curriculum rationale and architecture are described.

ANALYSES (1972 TO 1974)

EW TRAINING ANALYSIS. TAEG Report No. 4 (previously cited) provided a conceptual design for consolidation of EW operator training. Review and approval of this report by the CNO, fleet, and CNET established it as the basic guide for subsequent CNO/CNET EW consolidation plans and actions. Data from the report that have been utilized in or influenced EW operator curriculum design are:

- . a recommended student input population
- . a common core instructional strategy
- . an EW equipment functional commonality analysis
- . a preliminary EW operator common core curriculum outline
- . the selection of recommended instructional media
- . the conceptual design of generalized EW operator training devices
- . alternative training system configurations
- . a POA&M for developing the recommended training system configuration.

The surface EW school at Treasure Island, the precursor to the Consolidated EW school, utilized the report as a guide for curriculum improvements while CNO/CNET initiated actions in consonance with the TAEG report.

EW JOB ANALYSIS WORKSHOPS. In FY 73 CNO and CNET decisions were required concerning procurement of the generalized EW operator training device recommended in TAEG Report No. 4 (previously cited). Preliminary EW curriculum data and training device conceptual design data from the earlier EW training analysis needed refining to support these procurement decisions. To accomplish this task, TAEG conducted workshops with fleet subject matter experts (SMEs). The major product of these workshops was job task data for air/surface/subsurface equipment operators. These data corroborated the earlier findings on commonality of EW operator tasks and provided the basis for CNO decisions to procure the generalized EW operator training device. As recommended by TAEG, the initial step in the procurement was for a trainer definition study.

GENERALIZED ELECTRONIC WARFARE TRAINING SIMULATOR (GEWTS)⁴ STUDY. The generalized EW operator training device proposed by TAEG represented an integration of state-of-the-art techniques in simulation and in computer assisted instruction. A trainer definition study by at least two independent contract sources was anticipated. However, funding limited this effort to a single contract. The

⁴ Daniel I. C. Blake. Feasibility Study for Generalized Electronic Warfare Training System (U) (GEWTS), NAVTRAEQUIPCEN Report ER-7701, March 1974, Naval Training Equipment Center, Orlando, FL 32813.

TAEG Report No. 56

contractor's analysis provided the Navy with two sets of data: (1) refined EW operator task analysis data and (2) training device configuration data. A listing of 21 billets for which task analysis data were developed is shown below.

Task Force Commander	Weapons Officer
Staff Operations	ASW Officer
Staff CIC	Fire Control Officer
Staff EW Officer	EW Supervisor
Staff Watch Officer	Airborne EWO (VQ and VAQ)
Communications Officer	EWO
Operations Officer	Assistant Search and Intercept Operator
CIC Officer	ESM Operator
EW Coordinator	ECM Operator
EW Reporting Net Coordinator	EW Plotter
Status Board Keeper	

A sample of the task listings for one billet from this list is shown in table 1. The training device configuration analysis provided guidelines that the Naval Training Equipment Center (NTEC), Orlando, Florida, utilized to develop procurement specifications for the device.

CONSOLIDATED NAVY ELECTRONIC WARFARE TRAINING PLAN (CNEWTP). Promulgated in January 1974, the CNEWTP states that, "The consolidation of Navy Electronic Warfare Programs under a single comprehensive plan is the cornerstone to establishment of an Electronic Warfare Training System as described by this plan."

The plan is the CNO's official policy statement and POA&M for consolidation of EW training. It incorporates components of earlier studies, analyses, and major policy decisions. The training plan defines goals which must be achieved through the consolidated EW school operator training curriculum. In addition, this annually updated plan provides the most current data on anticipated school input population and the outyear projections of average-on-board (AOB) student count for each type of trainee. Its use in curriculum design is discussed subsequently in this section.

CURRICULUM DEVELOPMENT MILESTONES (APRIL 1974 TO JUNE 1976)

The most significant milestone influencing curriculum development during this period was the opening of the consolidated EW school at NTTC Corry Station, Pensacola, Florida, in May 1975. The surface EW training pipeline from Treasure Island, California, was the initial EW training program relocated to the new facility. The Naval Flight Officer (NFO) and enlisted Aviation Technician (AT) EW courses from the Naval Air Station, Glynnco, Georgia, were transferred subsequently. Within the first year of operation at the new facility, portions of the Communications Technician (CT) training (co-located at NTTC Corry) were transferred to the consolidated EW school. Training became centrally located with the arrival of the CT trainees and the Naval air and surface EW operators.

Initially, the surface EW, NFO, and CT training pipelines utilized the curricula employed in the previous school locations but soon began integrating common subject matter into their curricula even though each curriculum maintained

TAEG Report No. 56

TABLE 1. SAMPLE EW TASK LISTING (ESM BILLET)

MISSION	TASK DESCRIPTION	REQUIRED KNOWLEDGE	REQUIRED SKILL	CRITERIA FOR TRAINING	MEDIA VEHICLE
1.0 Pre-mission Operations					
1.1 Planning	1. Receive assignment from supervisor. 2. Review characteristics of known emitters. 3. Prepare enemy EOB. 4. Participate in training.	EW pubs ELINT Ops Orders Equipment characteristics	Planning	Ability to integrate knowledge of known emitters and equipment capabilities resulting in creditable enemy EOB.	
1.2 Pre-mission Checks	1. Perform turn-on procedures and operational checks. 2. Note and report deficiencies. 3. Perform antenna calibration. 4. Check internal and external communication circuits. 5. Perform corrective maintenance. 6. Perform sensor calibration procedures; e.g., gain, orientation, signal/noise ratio (check against fixed reference).	Equipment procedures Reporting procedures Corrective maintenance procedures Calibration procedures	Equipment operation Reporting Communication	Ability to perform complete operational checkout and calibration of equipment recognizing malfunctions and/or degraded modes. Correct malfunction/degraded modes.	
1.3 Intelligence Briefings	1. Attend TGG, SSEP briefings. 2. Update action plan to incorporate information obtained from briefing.	Action plans ELINT SIGINT	Planning	Ability to incorporate new information into existing plans as necessary.	
2.0 In-transit					
2.1 Final Equipment checkout	1. Insure all equipment on and operating correctly. 2. Conduct final operational check. 3. Man ESM equipment as directed.	Equipment procedures	Equipment operation	Ability to assure that equipment operating properly, recognizing malfunctions and/or degraded modes. Correct equipment or modify action plans as appropriate.	

SOURCE: Daniel I. C. Blake. Feasibility Study for Generalized Electronic Warfare Training System (U) (GEWTS), NAVTRAEEQUIPCEN Report ER-7701, Contract No. N61339-73-C-0159, March 1974. Naval Training Equipment Center, Orlando, FL 32813.

TAEG Report No. 56

a separate training pipeline identity. An important factor in this integration process was the exchange of information and ideas among the instructor/curriculum development personnel from the three EW communities.

In addition to the curriculum changes discussed above, a continuing effort was underway to improve instruction by converting the existing training programs from the traditional lockstep approach to an individualized learning system (ILS).

MILESTONES IN EW PROGRAM DEVELOPMENT (JULY 1976 TO APRIL 1977)

IMPACT OF DEVICE 10H1 PROCUREMENT ON CONSOLIDATED EW CURRICULUM DEVELOPMENT. Device 10H1 was designed to be utilized in a common core curriculum. The device procurement contract was negotiated in February 1976, even though the common core curriculum existed only as an outline. Events surrounding a contractual requirement that the Government provide EW mission training scenarios to the contractor stimulated efforts to complete the curriculum development.

Two EW mission training scenarios, developed by EW school personnel, were provided as part of the device contract. These scenarios represented a critical component of the 10H1 contract. They were to be utilized by the contractor in addressing:

- . lesson authoring techniques/needs
- . lesson library sizing
- . software architecture trade-offs
- . computer assisted instruction components
- . student/instructor interaction requirements
- . development of demonstration training exercises.

Subsequent to the analysis of the scenarios, the contractor requested that the Government provide additional scenarios containing significantly more detailed EW mission data than previously provided. Concerned over this problem, CNO OP-099 requested that CNET task the TAEG to assist the training command in maintaining the integrity of the Device 10H1 concept (CNO letter OP-099 Ser 992F4/64335 of 10 May 1976). The Chief of Naval Education and Training responded by tasking TAEG to: (1) act as advisor to CNET, (2) direct development of the required EW mission scenarios, and (3) assist "... as otherwise deemed necessary ..." to insure successful completion of the consolidated EW operator trainer procurement program (CNET letter Code N-223 of 2 July 1976).

In response to the July 1976 tasking, TAEG began immediate development of the detailed EW mission training scenarios. Additionally, all EW operator curriculum development requirements were assessed.

In August 1976, critical curriculum development tasks, shown in table 2, were identified and submitted to CNET for review and action. Simultaneously, work on the tasks was initiated. Tasks 1 through 3 have been completed and are described briefly below. Tasks 4 through 6 are underway and will be detailed in a subsequent report.

TABLE 2. COMMON CORE CURRICULUM DEVELOPMENT TASKS

<u>TASK</u>	<u>PROGRAM SUPPORT AREA</u>	<u>COMPLETION DATE</u>
1. EW Mission Scenarios	Device 10H1	15 Nov 76
2. Complete Front-end Analysis Methodology	Restructured Curriculum	15 Nov 76
3. Define Consolidated Operator Training Curriculum	Common-Core Pipeline	Oct 76
4. Contract for Device 10H1 Lessons	Consolidated EW Curriculum	Mar 80
5. Screen Existing Training Lessons	Consolidated EW Curriculum	Jan 78
6. Develop New Training Course Lessons (Including Audio-Visual)	Consolidated EW Curriculum	Sep 80

EW MISSION SCENARIOS. Task 1 (table 2) involved the development of five scenarios for the contractor. The Device 10H1 user project team (UPT) composed of EW SMEs from NTTC Corry designed and developed each scenario and was assisted in the task by TAEG.

Within the scenarios, 10 generic EW suites and their functional application in EW mission problems were presented. Each scenario was organized within a common EW operational mission structure. The mission scenario structure was derived from the GEWTS study and consists of the following phases:

1. Mission Preparation
2. Mission In-transit Operations
3. Mission Primary Area Search and Countermeasures Operations
4. Post-mission Operations

In accordance with contractual requirements, two scenarios depict a friendly force surface platform (ship) perspective, two scenarios depict a friendly force air platform (aircraft) perspective, and the fifth scenario presents a complex integrated friendly surface/air platform perspective. For purposes of scenario development, a subsurface platform (submarine) was considered as a surface EW platform. Each scenario contained the additional detail required by the contractor including information concerning:

TAEG Report No. 56

- . problem geometry
- . problem time line
- . mission events
- . EW operator "hands-on" operationally valid task sequences
- . appropriate EW equipment suites employed
- . EW operator performance criterion
- . required environmental events to elicit expected operator behavior necessary to achieve mission objectives
- . pre-mission problem orientation briefing.

The contractor will utilize the scenarios to build demonstration training exercises as deliverables with Device 10H1.

CONSIDERATIONS IN CURRICULUM DESIGN. A task within curriculum definition was the selection of training requirements to be fulfilled through resident training (EW School NTTC Corry) and the identification of those training requirements for nonresident training. In NAVEDTRA 106A⁵ procedures, instructional site selection occurs in a proceduralized manner following front-end analysis; i.e. job analysis, selection of tasks to be trained, development of job performance measures, and analysis of existing job relevant training. The past experience of the TAEG EW team has shown that the instructional site selection process is subtle and requires complex decisionmaking that cannot be fully proceduralized. How front-end analysis data are organized for purposes of instructional site selection and the point in time where issues of training effectiveness, cost effectiveness, instructional media selection alternatives, and management prerogatives are introduced in the process are considered to be critical. Stated more simply, the selection of where training occurs is considered to be a component of the overall systems analysis task in the instructional systems development (ISD) process. As with hardware development, a training system design should not be frozen until all critical variables have been analyzed and their interrelationship determined. It is through this process that a high confidence can be established in the credibility of the training system design.

The remainder of this section of the report details the application of the above concepts to the accomplishment of tasks 2 and 3 of table 2.

INPUTS FROM CONSOLIDATED NAVY EW TRAINING PLAN. The CNEWTP provides management direction for the consolidated EW operator training curriculum. The CNEWTP states that the overall training philosophy of the consolidated EW school is to tailor formal training to be the most relevant to the individual trainee based on both overall rate/rating tasks and ultimate duty station through the use of the generalized training device (Device 10H1). The term "generalized" as it relates to the EW operator curriculum is defined here as "...a set of learning experiences within a training program in which the student learns the facts, principles, concepts, rules, procedures and technology determined to be representative of selected common-core operator and/or maintenance job tasks for certain category(ies) or class(es) of operational equipment." By this definition, a generalized training device may not include all the functional capabilities of every equipment within a category or class. This implies that functional capabilities deleted from a generalized trainer are candidates for other media and/or training locations.

⁵ Interservice Procedures for Instructional Systems Development. NAVEDTRA 106A. 1 August 1975. 5 volumes. Stocked at Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

Figure 1 depicts the utilization of a common-core curriculum by the diverse input population projected for the consolidated EW school. Appendix A provides a profile of the current and projected trainee input population defined in the CNEWTP. Figure 2 shows the fit of the consolidated EW operator training pipeline within the EW school itself as well as the total Navy-wide EW training system.

Tables 3, 4, and 5 identify course lengths and estimated student annual input loads for formal training at the EW school. Table 6 provides a summary of the student population.

In addition to the data contained in the figures and tables identified above, the following factors from the CNEWTP were used in developing the EW operator training system:

- . The input population is varied.
- . Common-core training should be maximized.
- . Allowable course lengths are established.
- . Input population per year and the average on board population are defined.
- . Follow-on training will occur at fleet activities.

Device 10H1 Considerations. Analysis of the capabilities and limitations of the generalized EW Operator Trainer, Device 10H1, identified additional factors that were considered in the systems analyses. These factors are:

- . The Device 10H1 can provide individualized training for each trainee as well as teams of trainees.
- . Training in Device 10H1 is under CAI control.
- . Any student station in the trainer can provide a generalized representation of the EW suites of equipment shown in table 7.

The device will provide the functional capabilities listed in table 8 which are commonly found on fleet EW equipment.

Treatment of Job Analysis Data. As previously stated, EW operational missions can be divided into four phases; i.e., (1) pre-mission planning, (2) in-transit operations, (3) primary mission area intercept search and countermeasure operations, and (4) post-mission operations. The EW mission phase structure was utilized to organize EW job analysis data; i.e., duties and tasks were clustered under the mission phase in which their performance is required on the job. This methodology was also utilized by the GEWTS study contractor for the analysis of 21 EW billets. An advantage of the EW mission structure is that it contains the requirements for all Navy EW operator jobs. In addition, this structure facilitated accomplishing the following:

- . Identification of duties and tasks that are performed with some variation in different phases of the mission.
- . Identification of job task commonality within each mission phase for 21 EW billets.
- . Relation of training requirement priorities to EW mission priorities.

TAEG Report No. 56

COURSE MATERIAL	STUDENT INPUT														
	EW 0000	EW 1111	EW 1111 CONVERTEE	ET (SS)	AT (B23)	CTT ELINT	CTM	MSG DIRSUPOFF	SURFACE EWO	SQUADRON EWO	VQ NFO	VMAQ NFO	VMAQ MARINES	VQVAD PILOT	17XX
SCHOOL INTRODUCTION/PRE-EXAMINATION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SECURITY/CLASSIFIED INFO HANDLING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
CAREER INFORMATION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
HUMAN GOALS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
PSYCHOLOGICAL AND PSYCHOLOGICAL EVAL	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SAFETY	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
MATHEMATICS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BASIC ELECTRONICS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
TRANSMISSION AND RECEPTION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
RADAR SYSTEMS TECHNOLOGY	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
BASIC ELECTRONIC WARFARE TECHNOLOGY	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
EW FUNCTION, ORGANIZATION, PROCEDURES	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ELECTRONIC WARFARE CONCEPTS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
INTRODUCTION TO ELINT	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
INTRODUCTION TO COMINT	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
INTRODUCTION TO DEFENSE SYSTEMS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SIGNAL RECOGNITION CONCEPTS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WEAPONS SYSTEMS RECOGNITION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
PLATFORM RECOGNITION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SATELLITE ELECTRONIC WARFARE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
EW COMMAND AND CONTROL	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WARFARE COMMUNITIES	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
EW OPERATIONAL PLANNING-INTRODUCTION	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ADVANCED EW OPERATIONAL PLANNING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ESM OPERATOR MISSIONS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ESM MISSION PLANNING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WATCHSTANDING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ECM OPERATOR MISSIONS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ECM MISSION PLANNING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ECM EVALUATOR MISSIONS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ELECTRONIC COUNTER-COUNTER MEASURES	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
TACTICAL COVER/DECEPTION/INTELLIGENCE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
NEW DEVELOPMENTS IN EW	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
FLEET OPERATIONS/TACTICS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
INTELLIGENCE UPDATE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ELECTRO-OPTICS CONCEPTS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ELECTRO-OPTICS OPERATIONS	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ELECTRO-OPTICS MAINTENANCE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
DRAWINGS, SCHEMATICS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PMS/TEST EQUIPMENT	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ESM EQUIPMENT MAINTENANCE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
ECM EQUIPMENT MAINTENANCE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
MAINTENANCE/ADMINISTRATION MANAGEMENT	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
PRELIMINARY NAVSECGRU TRAINING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
FOLLOW-ON NAVSECGRU TRAINING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
FOLLOW-ON FASOTRAGRU TRAINING	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
DIGITAL/LOGIC	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

Figure 1. Student/Subject Material Matrix (Source: CNEWTP)

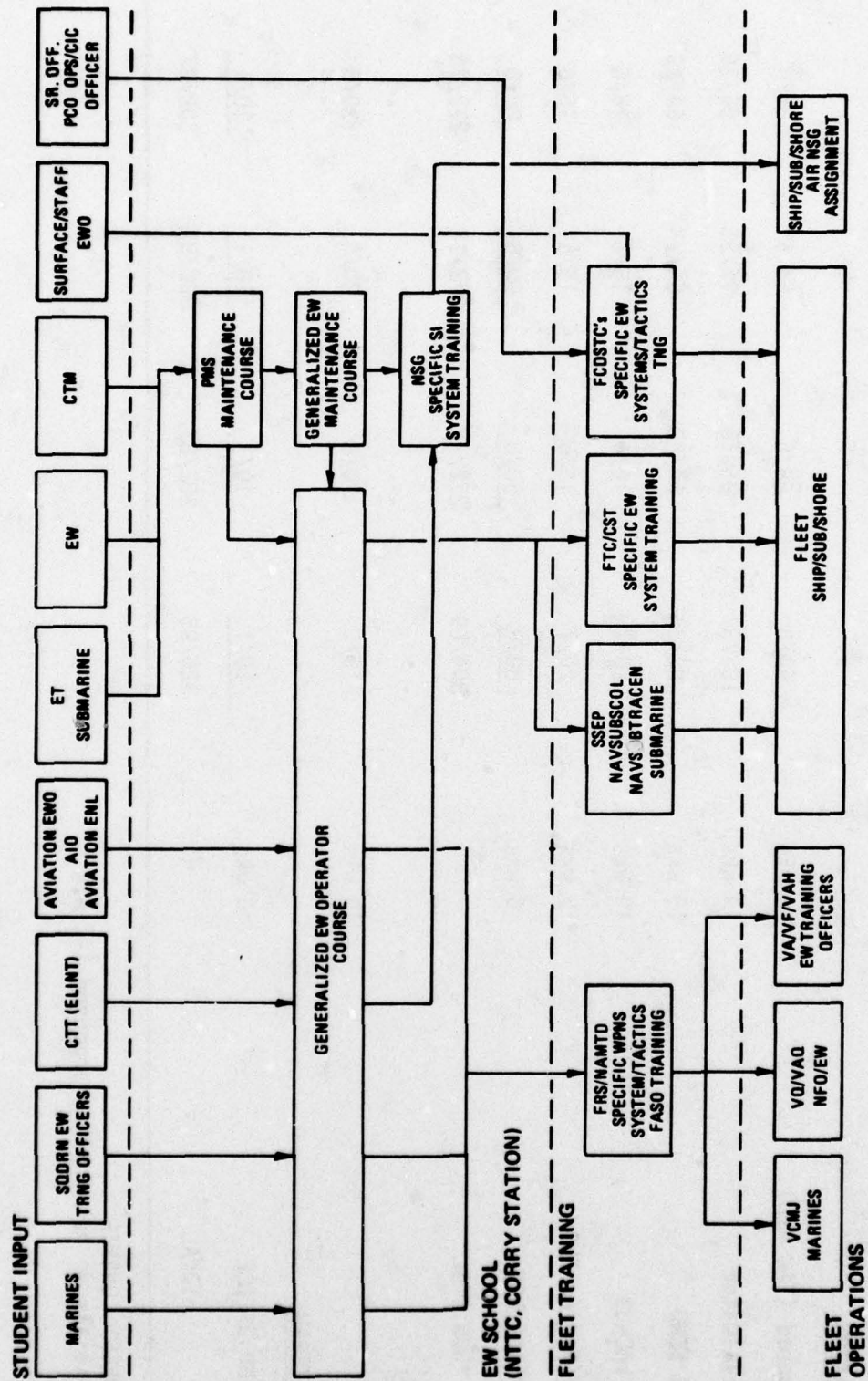


Figure 2. EW Training Pipeline (Source: CNEWTP)

TABLE 3. STUDENT ANNUAL INPUT LOAD FOR FORMAL TRAINING AT
THE EW SCHOOL, NTTC CORRY (OFFICER)

<u>AVIATION</u>	<u>APPROX. COURSE LENGTH (WKS)</u>	<u>FY77/77 INPUT/AOB</u>	<u>FY78 INPUT/AOB</u>	<u>FY79 INPUT/AOB</u>	<u>FY80 INPUT/AOB</u>
Proposed (TAC AIR)	5 wks	64/6	64/6	64/6	64/6
VQ Evaluator	19 wks	102/37	96/35	96/35	96/35
EA-6 ECMO	19 wks	82/30	64/23	64/23	64/23
NFO VAQ-33	19 wks	20/7	16/6	16/6	16/6
EA-6 Marine EMO	19 wks	20/7	16/6	16/6	16/6
VQ Pilot/NAV	5 wks	80/8	80/8	80/8	80/8
*SUBTOTAL		304/89	272/78	272/78	272/78
<u>USMC</u>					
EMO	16 wks	12/5	20/8	20/8	20/8
<u>NAVSECGRU</u>					
DIRSUP OFFICE	6 wks	10/1	10/1	10/1	10/1
TOTAL		326/95	302/87	302/87	302/87

SOURCE: CNEWTP

*Subtotals do not include proposed TAC AIR

TABLE 4. STUDENT ANNUAL INPUT LOAD FOR FORMAL TRAINING AT THE EW SCHOOL, CORRY (ENLISTED)

<u>SURFACE*</u>	APPROX. COURSE LENGTH (WKS)	FY77/77 INPUT/AOB	FY78 INPUT/AOB	FY79 INPUT/AOB	FY80 INPUT/AOB
NEC EW-0000	20	239/92	214/82	184/71	190/73
NEW EW-1711	55-59	436/436	295/295	250/250	220/220
SUBTOTAL		675/528	509/377	434/321	410/293
<u>SUBSURFACE</u>					
Maintenance	20	50/19	120/46	120/46	120/46
SUBTOTAL		50/19	120/46	120/46	120/46

* The following listing is the latest update (Dec 1977) of student input for surface training. This listing supersedes the NEC EW-0000 and NEC EW-1711 above.

COURSE	WEEKS	79	80	81	82	83	84
MLR - 1	12	455	455	-	-	-	-
MLR - 8	11	14	28	28	19	14	24
SLQ - 17	17	14	21	21	19	19	21
SLQ - 32	9	216	291	373	391	333	-
MLR - 11	4	71	71	71	71	-	-
SLQ - 26	10	UNK	UNK	UNK	UNK	UNK	UNK

TABLE 4. STUDENT ANNUAL INPUT LOAD FOR FORMAL TRAINING AT THE EW SCHOOL, NTTC CORRY (ENLISTED) (continued)

<u>NAVSECGRU</u>	<u>APPROX. COURSE LENGTH (WKS)</u>	<u>FY77/77 INPUT/AOB</u>	<u>FY78 INPUT/AOB</u>	<u>FY79 INPUT/AOB</u>	<u>FY80 INPUT/AOB</u>
Maint (CTM) **	17	50/16	TBD	TBD	TBD
Op (USMC) ***	10	20/4	16/4	16/4	16/4
Op (CTT) ***	10	66/13	49/9	61/12	65/13
SUBTOTAL		136/33	65/13	77/16	81/17
GRAND TOTAL		861/580	694/436	621/383	611/356

** The 17 weeks of electronics training for EWs is under review for applicability to CTMs. Earliest CTM input to this course would be FY77.

*** CTT ELINT Operator Course extended to 10 weeks by CNTT msg 182345Z Nov 1975.

SOURCE: CNEWTP

TABLE 5. STUDENT ANNUAL INPUT LOAD FOR FORMAL TRAINING AT THE EW SCHOOL,
NTTC CORRY (RESERVE, CIVILIAN, AND OTHER SERVICES)

	APPROX. COURSE LENGTH (WKS)	FY77/77 INPUT/AOB	FY78 INPUT/AOB	FY79 INPUT/AOB	FY80 INPUT/AOB
<u>RESERVE</u>					
Officer (TBD)					
Enlisted (TBD)					
<u>CIVILIAN</u>					
Maintenance (ULQ-6)	8	10/2	15/3	15/3	15/3
Maintenance (WLR-1)	12	10/3	10/3	10/3	10/3
<u>COAST GUARD</u>					
Maintenance	12	30/8	30/8	30/8	30/8
<u>FOREIGN</u>					
	17-26	TBD	TBD	TBD	TBD
TOTAL		50/13	55/14	55/14	55/14

SOURCE: CNETP

TABLE 6. SUMMARY OF STUDENT ANNUAL INPUT LOAD FOR FORMAL TRAINING AT THE EW SCHOOL, NTTC CORRY

<u>Officers</u>	<u>FY77 & 77 INPUT/AOB</u>	<u>FY78 INPUT/AOB</u>	<u>FY79 INPUT/AOB</u>	<u>FY80 INPUT/AOB</u>
Aviation	967/82	950/80	948/80	948/80
Surface (TBD)				
NAVSECGRU	10/1	10/1	10/1	10/1
USMC	12/5	20/8	20/8	20/8
	<u>989/88</u>	<u>980/89</u>	<u>978/89</u>	<u>978/89</u>
SUBTOTAL				
<u>Enlisted</u>				
Aviation	64/9	48/9	48/9	48/9
Surface	675/521	509/374	434/317	410/291
Subsurface	50/21	120/50	145/62	170/75
NAVSECGRU	413/104	386/104	410/108	418/108
Coast Guard	38/8	30/8	30/8	30/8
	<u>1240/673</u>	<u>1093/545</u>	<u>1067/504</u>	<u>1076/491</u>
SUBTOTAL				
<u>Other</u>				
Civ & For	72/28	77/29	77/29	77/29
	<u>2301/789</u>	<u>2150/663</u>	<u>2122/622</u>	<u>2131/609</u>
TOTAL				

SOURCE: CNEWTP

TAEG Report No. 56

TABLE 7. EW SUITES AND ASSOCIATED EW OPERATIONAL EQUIPMENT

<u>SUITE NAME</u>	<u>ASSOCIATED EW EQUIPMENT</u>
(1) EP-3E	ALR-44 SR212 ARGOS IFM ALD-8 PEDCOG
(2) EA-6B	ALQ-92 ALQ-99 ALE-29 ALQ-126 ALE-41
(3) TACAIR	ALR-45/50 ALE-41/37 ALE-29 ALQ-126
(4) DD963	WLR-1/WLA-3 WLR-11/MX9414 RBOC AN/SLM-1 AM 4255
(5) CARRIER A	WLR-1/WLA-3 SLQ-26 WLR-11/MX9414 RBOC AN/SLM-1 AM 4255
(6) CARRIER B	WLR-8 SLQ-17 (Type)
(7) DD/CL-A	WLR-1/WLA-3 ULQ-6/SLA-12/15 RBOC PEDCOG AM 4255 AN/SLM-1
(8) DD/CL-B	SLQ-17/SLQ-31 (Type) RBOC
(9) SUB	WLR-6 Pos 4 WLR-6 Pos 5 PEDCOG

TABLE 8. GENERALIZED EW EQUIPMENT FUNCTIONAL CAPABILITIES

ELECTRONIC SURVEILLANCE MEASURES
ELECTRONIC COUNTERMEASURES/DECEPTIVE
ELECTRONIC COUNTERMEASURES
MANUAL OPERATION
SEMI-AUTOMATIC OPERATION
AUTOMATIC OPERATION
WARNING DISPLAY
PANORAMIC DISPLAY
DIRECTION FINDING DISPLAY
PULSE ANALYZER
AUDIO OUTPUT
AUTO SIGNAL SORTING
AUTO THREAT REACTIVE SYSTEM
RF TRANSMITTER
COMPUTER AIDED CONTROL OF EQUIPMENT
NONELECTRONIC DEFENSIVE TACTICS

TAEG Report No. 56

Analysis of EW job task data produced by efforts discussed previously in this report resulted in the data in tables 9 and 10. Table 9 presents common air, surface, and subsurface EW job tasks in typical sequence of performance within mission phases. Table 10 shows 14 skills and 60 areas of knowledge involved in accomplishment of these tasks. Further analysis identified five classification categories for the knowledge areas of table 10:

- . mission organization/functions/jobs
- . electromagnetic radiations
- . signal identification
- . signal classification
- . EW intelligence.

In addition, the EW job task data analysis showed that Navy EW operators have three essential roles during a mission: (1) maintenance of the functional control of EW equipments, (2) application of EW equipment functional capabilities for electronic surveillance and electronic countermeasures, and (3) tactical decisionmaking.

The EW Operator Problem-Solving Model for Use in EW Operator Curriculum Design. The strategy selected for EW operator curriculum design is that each EW student will be trained to be a problem solver. That is, in the curriculum, job problems will be identified and their solutions stressed in each instructional cell. Skills and knowledge will not be taught as simply enabling objectives to the learning of task elements or tasks but, rather, as information and capabilities required to solve problems as they exist on the job. The instruction will show how the integration of previous learning experience with the present learning experience leads to the solution of problems. The process will be iterative so that at completion of the training cycle the trainee will have a mentally imbedded structure through which he can relate his training experiences to the overall job requirements and explain both their significance and the value of their application to problem solving.

Assisted by EW SMEs, TAEG utilized the data in tables 9 and 10 to develop the problem-solving model shown in figure 3. This model was used to select EW operator curriculum subject matter and to determine the instructional sequence of the subject matter. The results are discussed subsequently. The model will also be used by lesson designers as an aid in structuring the content of each lesson; i.e., to insure that each lesson relates how the lesson material is used in solving specific EW job problems.

Selecting the Sequence of Instruction. The selection of the sequence of instruction for the consolidated EW operator training curriculum was guided by the problem-solving curriculum strategy with the following constraints:

1. Within the EW mission phases, the EW operator duties/tasks have the following general relationships, each a prerequisite for the next.

TAEG Report No. 56

TABLE 9. EW DUTY/TASK LISTING WITHIN MISSION PHASE FRAMEWORK

DUTY	TASK	DUTY/TASK DESCRIPTION
1.0	Pre-mission planning.	
	1.1	Receive mission assignment from supervisor.
	1.1.1	Obtain operation order, electronic order of battle (EOB), and attend intelligence briefing to obtain latest intelligence data.
	1.2	Mission plan development.
	1.2.1	Organize EOB data into mission phase/area listings.
	1.2.2	Determine and/or verify proper reporting/reaction authority.
	1.2.3	Determine threat signals own equipment can react to.
	1.2.4	Prepare anticipated threat characteristic listing.
	1.2.5	As appropriate, coordinate mission SOP with team members.
	1.2.6	Determine equipment response mode of operation to be used in mission.
	1.3	Perform equipment operational status checks.
2.0	In-transit mission operations.	
	2.1	Receive orders to run test range with equipment.
	2.2	Conduct equipment performance range tests as directed by range officer.
	2.3	Verify proper equipment/software procedural/operational status.
	2.4	Monitor equipment status in appropriate mode of operation.
	2.5	Observe emission control (EMCON) instructions, as appropriate.
	2.6	Recognize and identify equipment malfunctions and/or degraded modes of operation.

TABLE 9. EW DUTY/TASK LISTING WITHIN MISSION PHASE FRAMEWORK (continued)

DUTY	TASK	DUTY/TASK DESCRIPTION
	2.7	Notify supervisor of equipment malfunctions, degraded modes of operation, and return to operational status.
	2.8	In coordination with team members as appropriate, perform signal evaluation.
	2.8.1	Threat signal interception.
	2.8.2	Threat signal analysis and identification.
	2.8.3	Threat signal intent evaluation.
	2.8.4	Threat signal reports to designated authority.
	2.8.5	Changes equipment modes and signal response parameters as appropriate.
	2.8.6	Activate and operate equipment in appropriate countermeasures mode.
	2.8.7	Report equipment malfunctions to supervisor as appropriate.
	2.9	Report changes in threat signal activity to appropriate authority.
	2.10	Commence jamming as required.
	2.11	Receive report that primary area of mission operations has been reached.
3.0		Primary mission area intercept search and countermeasure operations.
	3.1	Assemble appropriate threat signal listing from pre-mission plan.
	3.2	Set equipment modes and signal response parameters as appropriate.
	3.3	Conduct mission area intercept search and countermeasures with equipment in coordination with other team members.
	3.3.1	Threat signal interception.

TAEG Report No. 56

TABLE 9. EW DUTY/TASK LISTING WITHIN MISSION PHASE FRAMEWORK (continued)

DUTY	TASK	DUTY/TASK DESCRIPTION
	3.3.2	Threat signal analysis and identification.
	3.3.3	Threat signal intent evaluation.
	3.3.4	Threat signal reports to designated authority.
	3.3.5	Change equipment modes and signal response parameters as appropriate.
	3.3.6	Activate and operate equipment in appropriate counter-measure mode.
	3.3.7	Evaluate effectiveness of countermeasures.
	3.3.8	Threat signal logkeeping as appropriate.
	3.4	Report equipment malfunctions to supervisor as appropriate.
	3.5	Prepare situation and status reports for debriefing and/or to give to relief.
4.0		Post-mission operations.
	4.1	Prepare, verify, and submit necessary reports.
	4.2	Provide appropriate inputs at mission debriefing.
	4.3	Document equipment malfunctions for corrective action.

TABLE 10. COMMON-CORE SKILL AND KNOWLEDGE REQUIREMENTS
FOR NAVY EW OPERATORS

<u>EW OPERATOR SKILLS</u>	
1. Planning	9. Judgment
2. Equipment operations	10. Interpretation of hostile emitter capabilities
3. Detection, evaluation and interpretation of signals	11. Interpretation of displays
4. Cognition	12. Plotting emitters
5. Reporting	13. Analysis
6. Tactical decisionmaking and action selection	14. Threat identification
7. Communication	
8. Understanding of signals created by friendly forces	
<u>EW KNOWLEDGE AREAS</u>	
1. EW publications	12. EMCON in accordance with EW publications
2. EOB	13. Band assignments
3. OP Orders	14. Frequency assignments
4. ELINT	15. Search procedures
5. SIGINT	16. DF procedures
6. Equipment characteristics	17. Signal characteristics
7. Equipment operations	18. Logging procedures
8. Equipment procedures	19. Corrective maintenance procedures
9. Weapon system characteristics and capabilities	20. Range test procedures
10. Emitter equipment characteristics and capabilities	21. Calibration procedures
11. EMCON	22. Reporting procedures

TABLE 10. COMMON-CORE SKILL AND KNOWLEDGE REQUIREMENTS
FOR NAVY EW OPERATORS (continued)

<u>EW KNOWLEDGE AREAS (continued)</u>	
23. Action plans	45. Range finding procedures
24. Communication procedures	46. Team roles
25. Relationships between signals	47. Plotting procedures
26. Signal environment	48. HERO and EMCON procedures and constraints
27. Effects of degraded mode of operations	49. Interpret OP order
28. Threats and nonhostile threats	50. Prepare team instructions
29. Fleet EW capability	51. Platform and personnel capabilities
30. Threat priorities based on range and kill probability	52. Emergency procedures
31. Watchstander's criteria	53. Violation reporting
32. Equipment operation watch requirements	54. Own force and enemy strategic capabilities and limitations
33. CIC operational requirements	55. Satellite capabilities
34. Watch team requirements	56. Tactical maneuvers
35. NTDS link procedures	57. Enemy platform and source documents (DIA and STIC)
36. Test equipment requirements	58. Force reaction potential
37. ECMO and ECM plans	59. Enemy ESM
38. Checkout schedule	60. DECM procedures and capabilities
39. Light off criteria	
40. FEOB	
41. Ship system requirements	
42. Jamming equipment capability	
43. Pre-mission computer initialization	
44. Jamming procedures	

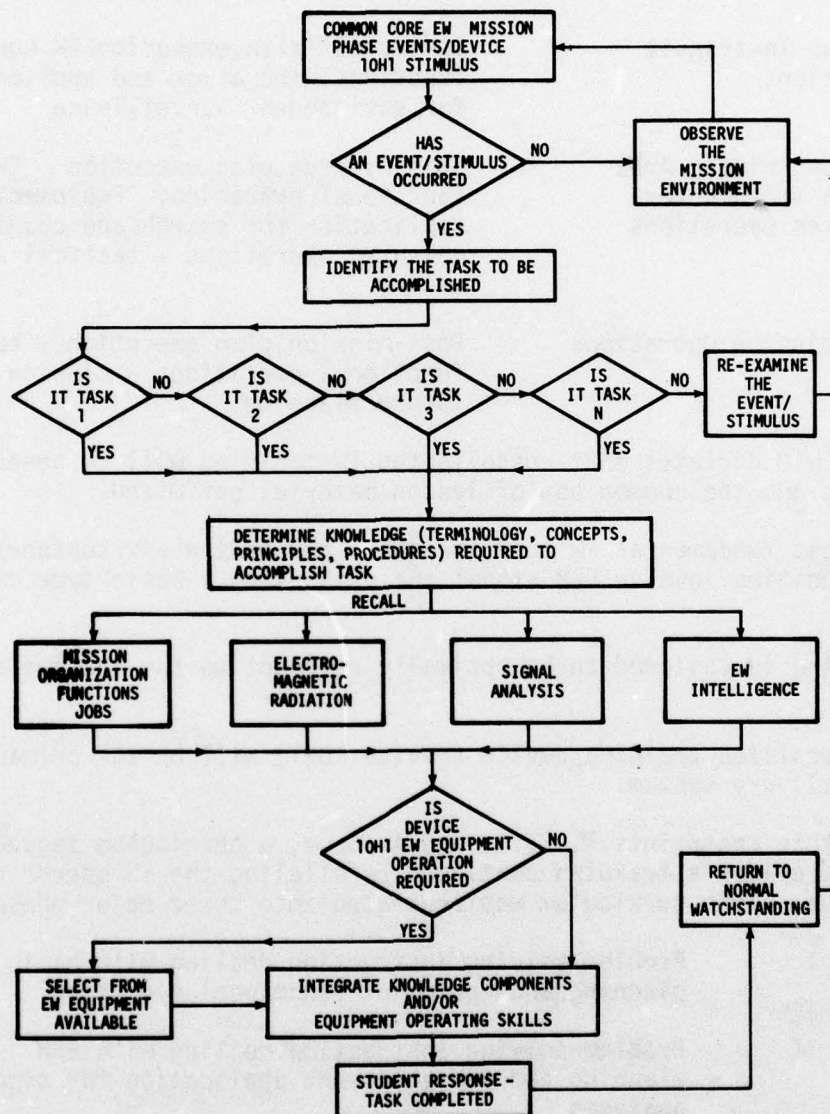


Figure 3. General EW Operator Problem-Solving Model

TAEK Report No. 56

<u>Mission Phase</u>	<u>Roles</u>
I Mission Preparation	Pre-mission planning/EW equipment functional operation and checkout
II Mission In-transit Operations	In-transit plan execution/EW equipment functional operation and application for environment surveillance
III Mission Primary Area Search and Counter-measures Operations	Primary area plan execution - EW equipment functional operation. Equipment application for search and counter-measures operations - tactical decision-making
IV Post-mission Operations	Post-mission plan execution - equipment functional operations - mission debriefing - future planning

2. The CNEWTP dictates that consolidated EW training will be generalized for all trainees and the common use of lesson material optimized.

3. The most fundamental EW operator tasks across the air/surface/subsurface communities involve ESM signal analysis using a basic type of EW ESM equipment.

4. Training is tailored to be optimally relevant to the trainee's ultimate duty station.

5. A generalized training device (Device 10H1) will be the primary instructional delivery system.

Working within constraints 1, 2, 3, and 4 above, a curriculum sequence was developed that provides a training continuum paralleling the EW operational mission continuum. This curriculum was separated into three major phases:

Phase I	Problem-solving instruction dealing with basic planning and equipment functional operation
Phase II	Problem-solving instruction dealing with ESM planning and ESM equipment application for signal analysis
Phase III	Problem-solving instruction dealing with mission watchstanding plans, equipment application for ESM/ECM operations. Tactical decisionmaking forms a large percentage of the latter portions of this phase of training.

Common core training is contained within phases I and II of the new curriculum. Phase I represents common core training for 100 percent of the input population while phase II would be required by approximately 70 percent of the input population; i.e., approximately 30 percent of the student population will not require signal analysis training. Phase III of the curriculum will

TAEG Report No. 56

provide training tailored to the specific needs of aviation, surface, and sub-surface students. The ability to tailor training for these students is provided by the unique capabilities of Device 10H1. As previously stated, this device is capable of simulating generic EW equipment and EW environmental perspectives relevant to air, surface, or subsurface EW communities. Therefore, the consolidated EW operator curriculum structure is:

<u>Type Training</u>	<u>Curriculum Phase</u>
Common-core training	Phase I
Community-specific training	Phase II
Special-track training (tailored for operational units)	Phase III

Figure 4 depicts the EW operator training curriculum flow by phases.

Selection of Training Tasks for the Consolidated EW Operator Training Curriculum. In selecting the tasks to be trained within the consolidated EW operator school, the relevant CNEWTP data, Device 10H1 characteristics, the guidance provided by a problem-solving instructional strategy and the three phase curriculum structure (discussed previously) were used in conjunction with instructional site selection criteria provided in NAVEDTRA 106A. Each job task was examined in terms of:

- . percent of population performing the task
- . time required for task performance
- . probability of inadequate performance
- . consequence of inadequate task performance on the job
- . frequency of task performance
- . tolerance for delay in task performance
- . learning difficulty level
- . time interval between acquisition of competency and use of the task on the job by the EW operator.

The NAVEDTRA 106A front-end methodology assumptions were used; i.e., training costs in time, manpower, and other resources were equal for each operational task and no management or administrative policy constraints existed other than those discussed in this report.

Operator tasks were first classified according to the following breakouts: (1) full-scale training is required, (2) review training only is required, (3) familiarization training only is required, (4) training to be deferred, and (5) no training required.

TAEG Report No. 56

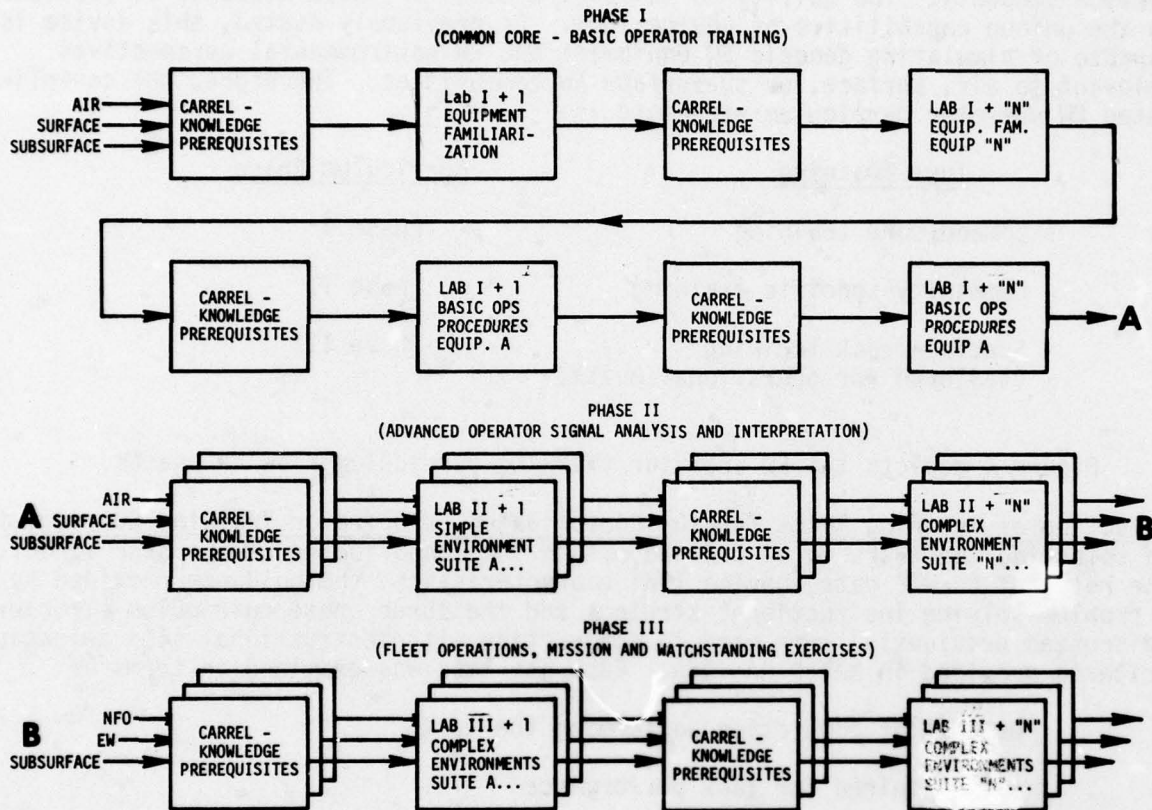


Figure 4. Consolidated EW Operator Training System Student Flow Model

TAEG Report No. 56

The tasks selected for training were assigned task performance proficiency levels (see table 11) required of EW school graduates.

The instructional site selection analysis determined that all of the tasks and the skills and knowledges listed in tables 9 and 10 are required in the EW operator curriculum to satisfy the objectives and meet the constraints established for the diverse input population.

The majority of the tasks designated for training at the EW school will be taught to proficiency level 7 (see table 11). Since EW operator duty station performance for most tasks is to proficiency level 8 (see table 11), fleet follow-on training will be required of EW school graduates.

TABLE 11. TASK PERFORMANCE PROFICIENCY LEVELS

1. Orientation and familiarization
2. Task nomenclature (identification, locations, names, facts, rules)
3. Task sequences presented at conceptual level
4. Tasks/procedures/methods learned at verbal level only
5. Perform components of duty/task with guidance and/or aids
6. Perform entire duty/task procedurally, without guidance and/or aids but at low level of mastery
7. Perform entire duty/task proficiently in job environment
8. Perform duty/task proficiently under unusual job conditions.

Validation of the Tasks Selected for Consolidated EW Operator Training. In an attempt to obtain a gross estimate of validity, the content of the new curriculum was compared with the existing curricula from the EW school. The existing NFO curriculum was selected as a baseline since it provides the most comprehensive EW operator training at NTTC Corry. The comparison was accomplished in the following manner:

- (1) The terminal and enabling objectives for each instructional module in the EW and CT curricula were compared to the related NFO instructional module terminal and enabling objectives.
- (2) The aggregate NFO, EW, and CT lesson module terminal and enabling objectives were then matched on a lesson module by lesson module basis against the task(s), skills, and/or knowledge(s) (from tables 9 and 10).
- (3) For each lesson module, a proficiency level from table 11 was assigned.

TAEG Report No. 56

- (4) For each lesson module, the appropriate NAVEDTRA 106A learning guideline and associated flow chart was identified.
- (5) To determine estimates of time to train in the new consolidated EW curriculum, the times to train from existing NFO, EW, and CT learning center and laboratory lessons were utilized.

As expected this comparison showed the existing NFO curriculum to have the highest subject matter correlation with the new consolidated EW curriculum. In the areas where each EW and CT curriculum lacked correlation with the new consolidated EW curriculum, the EW and CT SMEs agreed that the existing curricula were deficient. A significant result of the analysis was the determination that each of the existing curricula lacks the instructional strategies and subject matter sequence proposed for the new curriculum. The SMEs expressed the opinion that the new curriculum will produce more capable fleet EW operators than the current training program produces.

CNET ACTIONS CONCERNING CONSOLIDATED EW OPERATOR CURRICULUM DEVELOPMENT REQUIREMENTS

In parallel with the curriculum development activities discussed in the preceding paragraphs, the CNET staff determined the course of action to take on Device 10H1 development and training course lesson development (tasks 4 and 6 in table 2) based on the program plan TAEG has submitted to CNET in August 1976. A series of management reviews involving CNET, CNET SUPPORT, CNTECHTRA, EW school, and TAEG were held to discuss planning alternatives. In May 1977, CNET directed that development of lessons which use Device 10H1 (task 4), would be a contract effort. TAEG was tasked to write the statement of work for the contract. In order to utilize FY 77 dollars for the contract, CNET placed a 6-week completion deadline on the statement of work.

In addition, CNET directed that the remainder of the consolidated EW operator curriculum development requirements, including audio-visual instructional material development (task 6), would be accomplished utilizing IPD resources from CNET SUPPORT. The Training Analysis and Evaluation Group was designated as the IPD program manager for this effort.

In a concentrated effort, TAEG, EW school UPT members, EW school civilian training specialists, and other EW school SMEs developed the 10H1 teachware statement of work. For inclusion in the statement of work, the consolidated curriculum was developed to the following level of detail:

- . specification and sequencing of the curriculum instructional modules and lesson topics within each module for each phase of the curriculum
- . specification of the terminal and enabling objectives for each module and lesson topic including the criterion performance measures
- . specification of those modules and lesson topics that will be taught utilizing Device 10H1 as the instructional delivery media (defined as "on-line" modules and lesson topics as a matter of convenience)

TAEG Report No. 56

- . specification of those module and lesson topics that will be taught using other media/methods than Device 10H1 for delivery of instruction (defined as "off-line" modules and lesson topics as a matter of convenience)
- . specification of the modules and lesson topics required of the various type students; e.g., EW, CT, in the input population
- . development of guidelines to be utilized in designing on-line and off-line module and lesson topics to insure that the materials are consistent with the overall design goals for the consolidated EW operator training system.

CONSOLIDATED EW OPERATOR CURRICULUM

Table 12 contains an outline of the Generalized EW Operator curriculum. The topic outline is organized in three curriculum phases, forty-eight instructional modules, and individual learning topic sequences. In the complete statement of work, each learning topic is also summarized in terms of the type of training to be conducted (academic vice hands-on training), the number of hours of training involved, and which of the three communities (EW, CT, and NFO) and nine student tracks within the communities are to receive the topics of training. The nine student tracks are: NFO (VQ/VAQ/VAQ-33 (FEWSG)); Tactical Air; EW DD963 Suite; EW Carrier Suite A; EW Carrier Suite B; EW DD/CL Suite A; EW DD/CL Suite B; CTT; and ET (SS).

TABLE 12. TOPICAL OUTLINE OF GENERALIZED EW OPERATOR CURRICULUM

PHASE I - Basic Operator Training

Acquisition of EW operations common-core bodies of knowledge, Device 10H1 equipment familiarization, and basic EW operator procedures within EW mission phase framework using generalized EW operator problem-solving model.

Module

1. EW Function and Organization
2. Rcvr/Tx Systems and Radiation Characteristics
3. Principles of Radar
4. Principles of ESM Systems
- *5. ESM Rcvr Basic Operations (10H1)
- *6. Audio/Video Scan Recognition
- *7. Basic Operator Training Criterion Performance Test

PHASE II - Advanced Operator Signal Analysis and Interpretation

Use of Device 10H1 and EW operator common-core bodies of knowledge in normal operator tasks of signal analysis and interpretation within mission phase framework. Emphasis is on standardized operations procedures within structured mission events not requiring extensive tactical applications and decisionmaking on the part of the student.

Module

8. Introduction to Specific EW Communities
9. EW Publications
10. Specialized Radar and Pulse Coded Systems
11. E/O Functional Analysis
12. Introduction to Military Systems, Defense Structure and Philosophy
13. Guided Missile Systems
14. Satellites
- *15. Land-Based Weapon Systems
- *16. Land-Based ASCM Systems
- *17. Shipborne ASCM Systems
- *18. Airborne Weapon Systems
- *19. Air Interceptor Weapon Systems
20. Naval EW and ASW
- *21. Shipborne Air Defense Systems

TABLE 12. TOPICAL OUTLINE OF GENERALIZED EW OPERATOR CURRICULUM (continued)

PHASE III - Fleet Operations, Mission, and Watchstanding Exercises (Tactical Applications and Decisionmaking)

Use of Device 10H1 and EW operations common-core bodies of knowledge in relatively unstructured tactical applications and decisionmaking situations requiring EW operator judgment and problem solving.

Module

- *22. Manual Air Suite
- *23. Automatic Air Suite
- *24. TACAIR
- *25. Manual Surface Suite
- *26. Carrier Suite A (Manual Surface Suite)
- *27. Carrier Suite B (Automatic Surface Suite)
- *28. DD/CL Suite A (Manual Surface Suite)
- *29. DD/CL Suite B (Automatic Surface Suite)
- *30. Submarine Suite A (Automatic Surface Suite)
- 31. Standard ELINT Data Systems Codes and Formats (SEDSCAF) Manual
- *32. Signal Security (SIGSEC)
- 33. Emitter Correlation
- *34. ELINT Recording, Procedures and Reports
- *35. EW Shipboard Watchstanding Familiarization
- 36. ECM Mission Planning
- 37. Fleet Air Reconnaissance Planning
- 38. FEWSG Evaluator Concepts and Mission Planning Requirements
- *39. Manual Air Suite Operator and Evaluator Mission Proficiency Training
- *40. Automatic Air Suite Operator and Evaluator Mission Proficiency Training
- *41. TACAIR Suite Mission Proficiency Training
- *42. Manual Surface Suite Operational Watchstanding
- *43. Carrier Suite A Operational Watchstanding
- *44. Carrier Suite B Operational Watchstanding
- *45. DD/CL Suite A Operational Watchstanding
- *46. DD/CL Suite B Operational Watchstanding
- *47. Submarine Suite A Operational Watchstanding
- *48. Multiplatform, Multithreat Environment Training Mission

*Indicates Device 10H1 is utilized as the primary instructional delivery media for this module.

TAEG Report No. 56

SECTION III

FUTURE PLANS

INTRODUCTION

The new EW operator curriculum discussed in section II provides the basis for the ongoing non-10H1 instructional material development. Non-10H1 instructional material learning guidelines and learning activities must be specified prior to detailed module/lesson development. Appendix B contains TAEG guidance concerning learning guidelines and learning activities for non-10H1 lesson modules.

A continuing coordinated effort between the Government and the contractor is required in order to integrate and validate both on-line (10H1) and off-line (non-10H1) lesson material. Where conflicts arise, TAEG and NTEC will negotiate where the changes shall be made; i.e., Device 10H1 or non-Device 10H1 modules and lessons. The impact of Device 10H1 teachware components on non-10H1 instructional material development must be assessed. These components include:

- . Device 10H1 teachware design analysis results
- . Device 10H1 teachware master algorithm components
- . Device 10H1 CAI data base components including the remediation strategy and criterion performance measures
- . Procedures required to facilitate smooth student flow through CNEWS and CMI
- . Device 10H1 teachware tryout, implementation, validation, and revision.

For non-10H1 curriculum development, the following tasks will be undertaken by the designated personnel/activities:

<u>TASK</u>	<u>RESPONSIBILITY</u>
1. Survey existing modules and lessons for applicability to the new non-10H1 curriculum objectives.	NTTC Corry/IPD Curriculum Development Branch
a. Identify material in terms of the lesson topic(s) it best supports	
b. Determine the extent to which the existing modules and lessons meet the new curriculum objectives, their need to be modified, or the need to generate new modules and lessons.	

TAEG Report No. 56

<u>TASK</u>	<u>RESPONSIBILITY</u>
2. Identify the modules and lessons that need development (modification, additions, new material) by material type (P.I., sound/slide, T.V., others); special attention will be paid to the delivery media selected for the highly perishable elements of the EW subject matter.	NTTC Corry/IPD Curriculum Development Branch
3. Assign priorities on module and lesson development based on: a. Available personnel b. Available materials (tape A/V capability, etc.) c. Funds for materials/services d. Time needed/time to produce	TAEG
4. Schedule module and lesson development a. Begin/complete dates b. Personnel responsible c. Review cycles d. Approval cycles	TAEG

MILESTONES

Figure 5 shows the major milestones for the non-10H1 curriculum development task. These milestones are shown in relationship to the delivery schedule of Device 10H1 and Device 10H1 teachware development so that a proper perspective can be drawn among the three efforts.

EW OPERATOR TECHNICAL SUBSYSTEM FOR CURRICULUM DEVELOPMENT PROJECT

Figure 6 is a diagram of the EW operator curriculum development project work flow currently underway. It shows both Device 10H1 and non-10H1 technical tasks in curriculum development as separate but concurrent workflows along a timeline. Major events portrayed include the two design analyses and teachware/lesson material development efforts and their major products. An interface task integrates these Device 10H1 and non-10H1 efforts. The interface task also serves to ensure compatability of the end products (EW operator instructional materials) of the two major efforts. An existing curriculum material modification and update task is also shown occurring concurrently with the non-10H1 design analysis task. A major effort of the non-10H1 task will be the development of non-10H1 learning guidelines. These guidelines are to provide direction for the organization of specific lesson material content, media selection, and instructional system management subtasks which will occur during the curriculum development cycle. The schedules for curriculum update, tryouts, validation, and integration activities are also shown in

TAEG Report No. 56

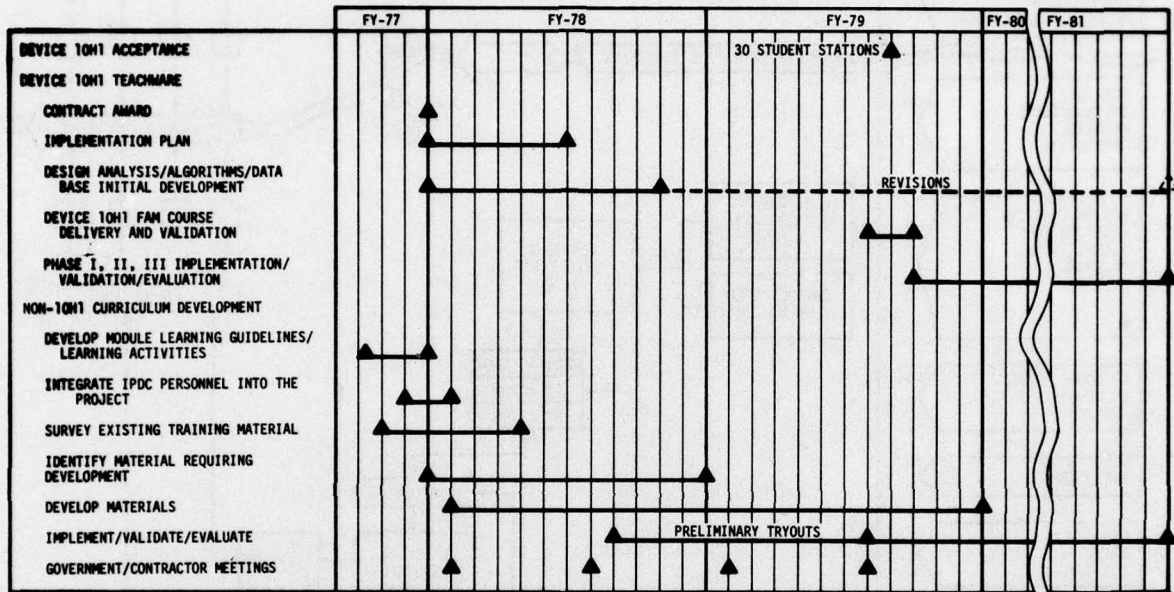


Figure 5. EW Curriculum Development Milestones

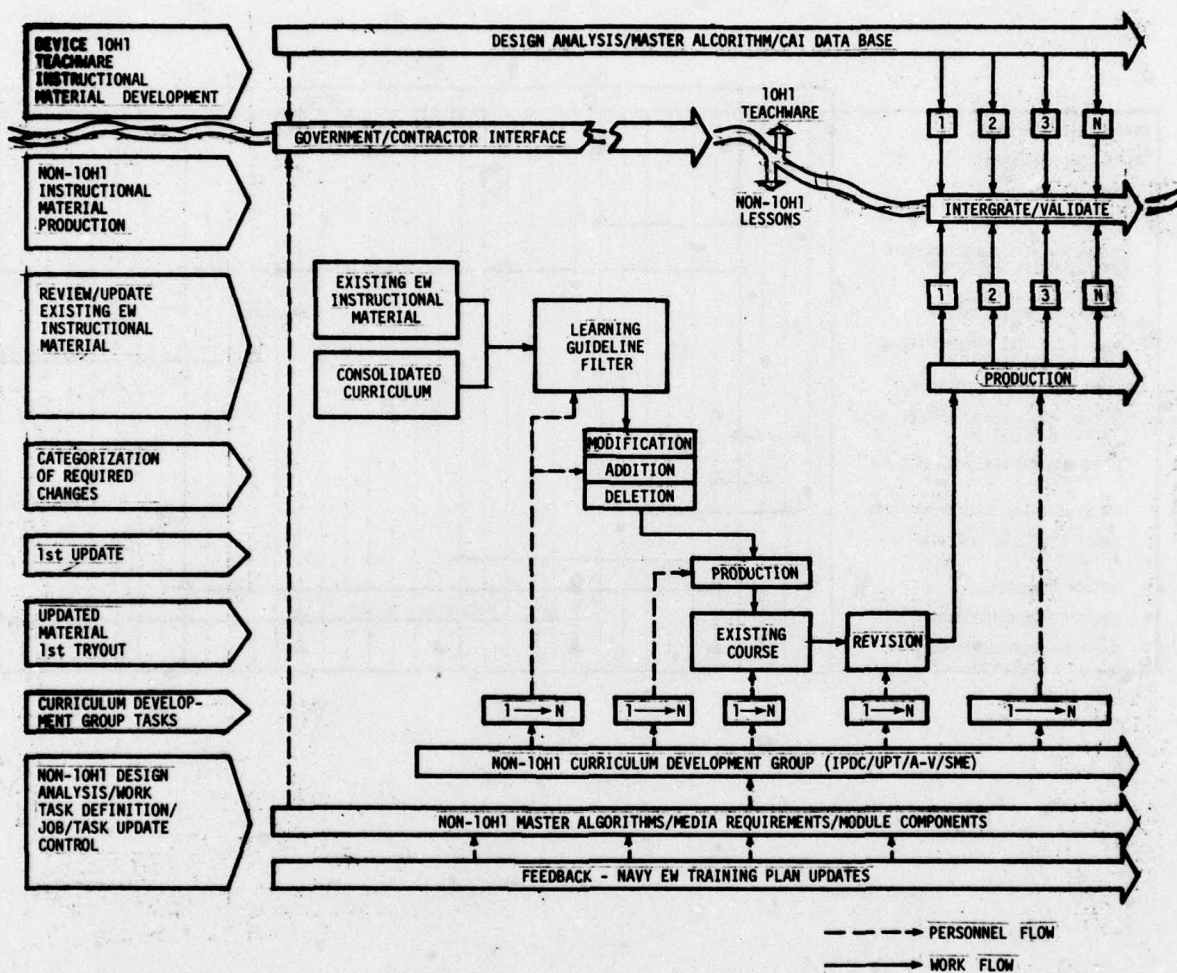


Figure 6. EW Curriculum Development Work Flow

figure 6. The purpose of figure 6 is to illustrate the variety of subtasks that will have to be accomplished during the curriculum development cycle and establish the requirement for flexibility and adaptability in the management and administrative subsystems which will support the project.

THE PLAN OF ACTION FOR DEVELOPING OFF-LINE (NON-10H1) EW OPERATOR CURRICULUM COMPONENTS

As manager of the non-10H1 (off-line) curriculum development, TAEG was required to submit to CNET SUPPORT a plan of action for accomplishing the curriculum development. The following milestones, identified in the POA&M, form the baseline for the point of departure for the design, development, and integration of the Device 10H1 and non-10H1 parts of the generalized EW operator training curriculum:

1. A user project team (UPT) has been established at NTTC Corry to assist in guiding the development of Device 10H1 and the teachware portion of the generalized curriculum.
2. The strategy, structure, and sequence of the Generalized EW Operator Training Program using Device 10H1 have been defined.
3. A new integrated air/surface/subsurface curriculum has been developed to the level of:
 - a. definition of lesson topics and modules
 - b. estimation of times to train
 - c. definition of terminal and enabling objectives
 - d. identification of common core, community specific, and nine special tracks of training
 - e. identification of those modules of training to be accomplished using Device 10H1 as the delivery media (on-line)
 - f. identification of those modules of training which do not require Device 10H1 as the delivery media (off-line).
4. A statement of work for sole source procurement of Device 10H1 teachware (on-line) from Grumman Aerospace Corporation has been developed.
5. The following stages in the instructional system design process were completed in arriving at 3b, c, and d above.
 - a. job analysis
 - b. selection of task and functions
 - c. analysis of existing courses

TAEG Report No. 56

- d. selection of instructional settings
- e. development of training objectives
- f. description of student entry skill and knowledge
- g. training sequence and structure.

The development of the generalized EW operator training curriculum is consistent with the initial phase outlined in phase III of NAVEDTRA 106A - DEVELOP.

MAJOR PREREQUISITES TO CURRICULUM DEVELOPMENT

There are several prerequisites to the successful development of the entire EW operator curriculum. These are:

1. A contract must be executed between the Government and Grumman Aerospace Corporation for the purpose of procuring the Device 10H1 training teachware specified in the statement of work. (This contract has been executed.)
2. Instructional Program Development (IPD) personnel must be located at NTTC Corry by the end of FY 77 as an integral component of the generalized EW operator curriculum development team. These personnel will be under the administrative control of CNET SUPPORT/NAVEDPRODEVGEN and under the management control of the TAEG EW project management team. (An Instructional Program Development Branch has been formed at the EW school, NTTC Corry.)
3. An in-house audiovisual capability located at Corry is desired. This capability is scheduled to be in place by the end of calendar year 1977. (An audiovisual instructional material development capability has been located at NTTC Corry.)
4. The Device 10H1 UPT will function as an integral component of the EW operator curriculum development team.
5. A minimum of eight EW SMEs composed of five EWs, one CTT, one AT, one ET, and three NFOs will be an integral part of the EW operator curriculum development team. (EW SMEs now form an operational part of the Instructional Program Development Branch.)

CURRICULUM DEVELOPMENT PROJECT MANAGEMENT

Figure 7 shows administrative and management relationships for personnel and activities involved in the development of the EW operator training system curriculum. There are four major tasks that must be successfully coordinated by TAEG if the EW curriculum is to be effectively designed and developed:

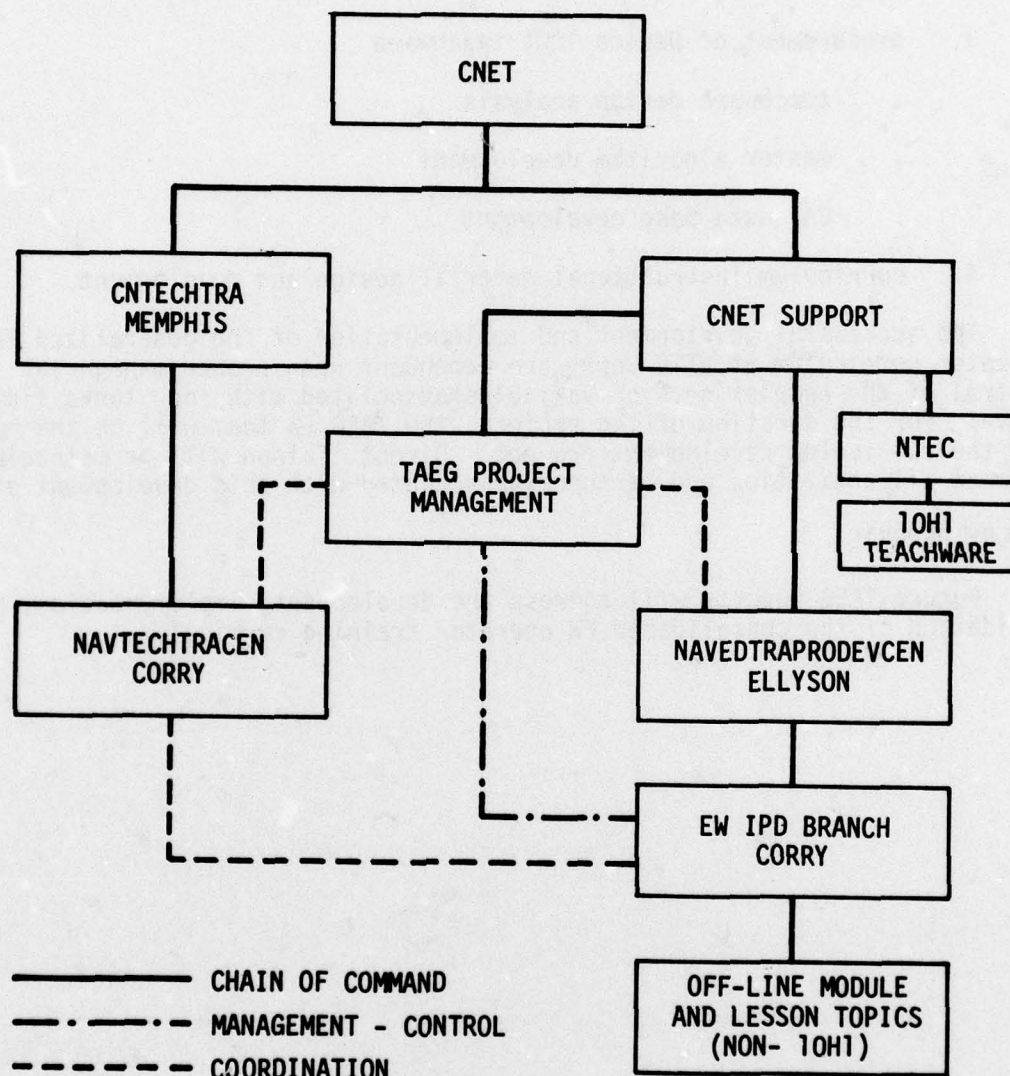


Figure 7. CNEWS Operator Training Curriculum Development
Organizational Relationships

TAEG Report No. 56

1. Device 10H1 procurement
2. design of consolidated EW operator curriculum
3. procurement of Device 10H1 teachware
 - . teachware design analysis
 - . master algorithm development
 - . CAI data base development
4. curriculum instructional material design and development.

The successful development and implementation of the generalized EW operator curriculum at NTTC Corry are dependent upon proper managerial control of the complex sets of variables associated with four tasks listed above. For the duration of the project, the TAEG EW team will be the manager for the curriculum development project. Direct liaison will be maintained between all activities and personnel associated with this development effort.

FUTURE REPORTS

Future TAEG reports will address the development, implementation, and validation of the consolidated EW operator training curriculum.

TAEK Report No. 56

APPENDIX A

PROFILE OF INPUT POPULATION TO CONSOLIDATED
EW OPERATOR TRAINING SYSTEM

TAEG Report No. 56

The following paragraphs, condensed from the CNETP, provide a brief descriptive profile of the current and projected types of students to be found in the consolidated EW operator training pipeline.

1. Student Input Population Profile

(a) Naval Flight Officer (NFO)

- (1) Fleet Air Reconnaissance EW Evaluator (VQ)
- (2) EA-6B (NFO) (VAQ)
- (3) VAQ-33 (NFO)
- (4) Marine Air EW Officer (VMAQ)

The above listed personnel are graduates of VT-10 (Basic Naval Aviator Orientation Training) and Advanced Jet Aircraft Navigation Training prior to entering the EW training at NTTC Corry. The exception is the Marine Air EW Officer who does not receive training at VT-10.

(b) Naval Aviator

- (1) EA-6B Pilot (Navy)
- (2) EA-6B Pilot (Marine Corps)

The above listed personnel have completed basic aviation training in single or multiple engine aircraft prior to entering EW training at NTTC Corry.

(c) Aviation EW Officer

- (1) Squadron EW Officer (Navy)
- (2) Squadron EW Officer (Marine Corps)

The above listed personnel are graduates of Basic Naval Aviator and Advanced Jet Aircraft Navigation Training and/or Basic Aviation Training in single or multiple engine aircraft, in addition to, replacement air group training prior to entering EW training at NTTC Corry.

(d) Naval Flight Officer (NFO) - Refresher Training

- (1) Fleet Air Reconnaissance EW Evaluator
- (2) EA-6B (NFO)
- (3) VAQ-33 (NFO)
- (4) Marine Air EW Officer (VMAQ)

The above listed personnel will have graduated from the training specified in paragraph (a) above and/or EW school, NTTC Corry. In addition, these personnel will be fleet EW experienced prior to entering refresher training at NTTC Corry.

TAEG Report No. 56

(e) Aviation Electronics Technician (AT)

The AT is a graduate of Basic Electricity and Electronics School and Aviation Electronics Technician Basic "A" School prior to entering EW training at NTTC Corry.

(f) Electronic Warfare Technician (EW)

The EW is a graduate of Basic Electricity and Electronics School prior to entering EW training at NTTC Corry.

(g) Cryptologic Technician Technical (CTT)

The CTT is a graduate of Basic Electricity and Electronics School. In addition, the CTT has had CTT Class "A" School training at CT School, NTTC Corry prior to entering EW training at NTTC Corry.

2. Consolidated Naval Electronic Warfare School (CNEWS) Training Concept

The following information provides a brief description of the general training concept at CNEWS for the student input population discussed in the preceding paragraphs.

a. Officer Training Requirements (Aviation). In the aviation community, there are a number of levels of training required for Naval Aviators, Naval Flight Officers, and Intelligence Officers. Necessary courses of instruction are aimed at meeting both a basic understanding of EW for all aviation personnel, as well as specific areas of training designed for particular billets and specialties.

(1) Basic Aviation Electronics Warfare (AVEW) officer training for NFOs (EVAL/ECMO) is presently being conducted at NTTC Corry. Naval Flight Officers assigned to a VAQ/VQ Squadron will be required to attend this extensive AVEW course. It is designed to develop the basic knowledge and skills prerequisite to operational training in the VAQ replacement training squadron or VQ operational squadrons. Particular emphasis is placed on familiarizing the replacement officer with electronic warfare principles, systems, equipments, support measures, emission characteristics, countermeasures and techniques. By means of simulated operational missions, the student develops the skills of an ESM/ECM planner, operator, and evaluator. The NFO is given a broad electronics background, proficiency in generic EW equipment operation and a thorough understanding of EW mission planning in fleet command and control procedures. The AVEW syllabus at NTTC Corry will insure that Navy and Marine Corps members of the Fleet Aviation EW community achieve the necessary special training objectives to ensure a trainable NFO at the replacement squadron level.

(2) All pilots assigned to a VAQ squadron will attend an abridged EW curriculum available at NTTC Corry, consisting of selected portions of the AVEW course. Emphasis is placed on key operational equipments, tactics, and EW planning.

(3) The Aviation Squadron Electronic Warfare Officer (EWO) Course at NTTC Corry is designed to provide the primary or collateral billet TACAIR/ASW squadron EWO with the knowledge and background required to carry out his duties and responsibilities as a consultant and training/readiness officer on EW matters. The course curriculum addresses basic duties, EW principles, organization, equipments, information resources, friendly and hostile systems, training, and integration of operations. The officer will be exposed to important capabilities, limitations, and responsibilities of all Tactical Aviation and Anti-Submarine Warfare communities.

b. Officer Training Requirements (NAVSECGRU). NAVSECGRU Direct Support Officer Training is conducted by NTTC Corry. A requirement exists for these officers to possess a fundamental knowledge of EW which will be obtained from selected modules of the consolidated EW curriculum.

c. Enlisted Training Requirements (Aviation)

(1) Aviation Enlisted ELINT Aircrewmembers. Training requirements have been promulgated by CNATRAININST 1542.24 (series) for tactical operator training. The Electronic Warfare Operational Intelligence Crewman (AT-8284) will provide the Fleet Air Reconnaissance Squadron (VQ) with an operator capability.

(2) Aviation Enlisted Operator. Basic aviation EW operator training will be provided by NTTC Corry; FASOTRAGRUs or the squadron concerned will provide unique training as required.

d. Enlisted Training Requirements (Surface). Surface Electronics Warfare Technician "A" School is located at NTTC Corry. To meet fleet requirements, the curricula is designed to provide the 6 year obligor with operator/maintenance training and the 4 year obligor with operator/preventive maintenance training. Operator skills are identified by the following Navy Enlisted Classification (NEC) codes:

1731	SLQ-32
1741	SLQ-17
1751	WLR-11
1761	WLR-1/ULQ-6

e. Enlisted Training Requirements (NAVSECGRU)

(1) NAVSECGRU CTT (ELINT) operator training is conducted at NTTC Corry. These personnel receive common EW/CTT training from selected modules of the consolidated EW curriculum in addition to training which is unique to NAVSECGRU requirements. CTT personnel destined for duty with VQ Squadrons will also complete an adjunct program derived from the aviation electronic warfare portions of the consolidated EW curriculum at NTTC Corry. NAVSECGRU has identified CTT (ELINT) career patterns and objectives to be supported by the training system.

TAEG Report No. 56

f. Training Requirements (Civilian). Personnel assigned to non-military jobs, such as the shipyards, intelligence agencies, treasury department, Federal Communications Commission, Federal Aviation Agency, and other EW related civil service billets, will be accommodated, for training purposes, in any school within the Electronic Warfare Training System satisfying their particular training requirements.

g. Training Requirements (Reserves). Personnel assigned to the Naval Reserve who require EW training may receive the required operator/maintenance training at the nearest appropriate training facility satisfying their requirements.

This training will be available to air, surface, and subsurface officer and enlisted reserve personnel.

TAEG Report No. 56

APPENDIX B

**TAEG GUIDELINES FOR
THE EW INSTRUCTIONAL PROGRAM DEVELOPMENT BRANCH**

COMMON-CORE JOB TASKS AND EARLY HANDS-ON TRAINING

The generalized EW operator curriculum design emphasizes the organization and integration of common-core subject matter in the initial phases of training. The amount, detail, complexity, and difficulty of student learning tasks are deliberately kept to a minimum during these phases of training until the student gains a competence to identify, integrate, and understand the information presented as components of a model to solve job problems. The instructional intent is to emphasize the organization and use of the conceptual framework of problem solving by the student as an aid to learning. This framework should enhance the student's learning as task proficiency level requirements are increased. This approach requires early hands-on use of Device 10H1 in instructional modules.

PHASE I--BASIC OPERATOR TRAINING DEVELOPMENT GUIDELINES. The major elements of phase I training are summarized in table B-1. The amount and level of detail of information, however, should be only that necessary for use by the student in hands-on familiarization experience with Device 10H1. Phase I training involves orientation, familiarization, simple procedure following, and memorization and recall. The following items are phase I curriculum design goals:

1. simple EW mission event situational content
2. low in amount of detail concerning bodies of knowledge
3. few, if any, operator diagnostic task requirements--heavy guidance cues provided
4. all information presented, learned, and used should be relevant to those phase I learning tasks
5. memorization and recall is a major component of training
6. standardized execution of procedures
7. emphasis on use of common-core EW subject matter concepts, rules, and relationships with selection, organization, and sequencing of information by the student
8. during phase I, maintaining control of EW equipment and basic signal analysis will be emphasized
9. utilize a broad spectrum of normal mission and signal environment situations and avoid use of infrequent or unique situations which preclude the use of standard procedures
10. develop student competency in Device 10H1 equipment familiarization and basic operations including selected simple signal analysis using maximum instructional cues and assistance and liberal performance (grading) criteria tolerance.

TABLE B-1. PHASE I - BASIC OPERATOR TRAINING (MODULES 1-7)

- . Acquire EW Bodies of Knowledge
- . Equipment Familiarization
 - . Nomenclature and Knobology
 - .. Types
 - .. Functions
 - .. Operator Uses
- . Basic Equipment Set-Up, Turn-On
- . Band Selection, Signal Intercept, Fine Tuning, Signal Recognition
- . Emitter Parameter Measurement
 - . Frequency
 - . Pulse Repetition Frequency
 - . Pulse Duration
 - . Beam Width
 - . Scan Rate
 - . Direction Finding

PHASE II--ADVANCED OPERATOR, SIGNAL ANALYSIS AND INTERPRETATION DEVELOPMENT GUIDELINES. In phase II of training the student will be responsible for normal signal analysis, identification, and interpretation procedures; that is, he must detect, analyze, identify, and interpret appropriate signals. Table B-2 summarizes the major objectives of phase II of the generalized EW operator curriculum.

TABLE B-2. PHASE II - ADVANCED OPERATOR AND EVALUATOR TRAINING (MODULES 8-21)

- . Emitter Identification and Classification by Radar Functional Types
- . Weapon System Identification, Site Determination, Location
- . Platform Identification, Location, Friendly/Hostile, Air/Surface/Subsurface/Land-Based/Satellite
- . Emitter Threat Evaluation

TAEG Report No. 56

The student will be responsible for:

- 1. mastery of basic operator signal analysis and response behaviors**
- 2. selection of appropriate categories and classification of informational elements and combining them in accordance with task requirements of the mission phase and segment.**

Training in this phase is to incorporate:

- 1. simple and complex situations progressing to a greater diversity of situations near the end of training**
- 2. initially low amounts of detail concerning bodies of knowledge used, progressing to moderately high levels of detail**
- 3. replacement of guidance cues with student initiated diagnostic procedures in the analysis and interpretation tasks**
- 4. insure continuity of learning tasks in this phase of training with previous phase of training.**

This phase of training will emphasize the student's use of the generalized EW operator problem-solving model and the bodies of common-core EW knowledge with which he has gained initial competence during phase I. He will be tested on the application of phase I knowledge as well as new knowledge introduced during this phase in terms of specific Device 10H1 signal analysis and interpretation sequences and procedures. The student will be required to identify the appropriate characteristics of the mission segment and the signal environment situation and will be expected to do the following using standardized procedures:

- 1. display diagnostic ability in identifying the information required for the classification of the signal analysis and interpretation situation**
- 2. execute standard common-core procedures appropriate for meeting the operator task requirements within the mission phase framework.**

At the end of phase II training, the student operator will be able to handle normal signal analysis and interpretation situations at the procedural level. The student's ability to diagnose such normal situations and rapidly recall and execute appropriate procedures prepares him for the more demanding judgmental and problem-solving situations he will encounter in phase III of training; i.e., community-specific tactical applications and decisionmaking processes within relatively unstructured situations.

PHASE III - FLEET OPERATIONS, MISSION AND WATCHSTANDING EXERCISE (TACTICAL APPLICATIONS AND DECISIONMAKING) TRAINING DEVELOPMENT GUIDELINES. In phase III of training, the student will be expected to utilize, in complex situations, the skills and knowledge acquired during phases I and II. Table B-3 summarizes

TAEG Report No. 56

the major objectives of phase III of the curriculum. The student is responsible for selecting and evaluating the appropriateness of response to a complex and rapidly changing environment. The curricular design guidelines for phase III are that:

1. The student is to progress from simple/complex situations early in phase III then to compound mission events later in this phase.
2. A high level of detail in bodies of knowledge is to be introduced.
3. Student operator requirements for tactical applications, diagnostic and problem-solving routines are to be introduced in detail.
4. Nonessential information is to be introduced gradually to increase the student's discrimination and judgment in handling the more difficult operator tasks.

TABLE B-3. PHASE III - FLEET OPERATIONS, MISSION, AND WATCHSTANDING EXERCISE TRAINING (MODULES 22-48)

- | |
|--|
| <p>I. Integrate the following items with II below:</p> <ul style="list-style-type: none">. Basic Operator Duties and Tasks. Advanced Operator and Evaluator Duties and Tasks. Reporting, Logging, Record Keeping <p>II. Tactical Applications and Decisionmaking:</p> <ul style="list-style-type: none">. Employment of Suites/Equipment. Use of Tactical Doctrine in Mission Scenarios. Complex Emitter Environments. Compound, Real-Time Mission Events. Team-Type Communication and Coordination Situations |
|--|

Major emphasis in phase III of training will be on the introduction of judgmental and decisionmaking tasks into the EW operator curriculum and the integration of these tasks or objectives into the framework of the student's previous two phases of instruction.

TAEG Report No. 56

During the completion stage of phase III of training, equipment operations, signal analysis and interpretation, and application of judgment will be emphasized. These three roles, although not always readily apparent to the operator, are essential to successful task responses. In addition, this phase will provide the opportunity for the student operator to apply judgment in tactical applications or decisionmaking, which in some cases may result in the rejection of standard procedures learned in phases I and II because of inappropriateness to a specific scenario.

The extent to which judgment will be employed by the students in phase III will be a function of:

1. community specific, common-core tasks and procedures (NFO, CTT, and EW)
2. the intentional inclusion of student judgment in the design of phase III.

TAEG Report No. 56

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